

REMARKS

I. Status of Claims

Claims 14-26 are currently pending. Without prejudice or disclaimer, Applicants have amended claim 14 to expressly state that which was implicit, i.e., the extruding step takes place via an extruder and the expanding and cross-linking steps c) and d) are carried out downstream of the extruder. Thus, this amendment does not narrow the scope of the claims. Exemplary support for this amendment occurs in the specification as-filed, e.g., Specification as-filed at page 12, lines 19-30 and Figure 3. Therefore, the specification provides written description support for the claim amendments.

II. Rejection under 35 U.S.C. § 103(a)

A. The Office maintains the rejection of claims 14-19 and 21-26 under 35 U.S.C. 103(a) as being unpatentable over WO 99/33070 to Belli et al. ("Belli") in view of WO 01/38060 to Harlin et al. ("Harlin") for the reasons of record. See Nov. 20, 2008, Final Office Action at 2-4.

Applicants respectfully traverse this rejection for the reasons of record and for the reasons below.

The Office's basis for the rejection appears to stem from a fundamental misunderstanding of the claimed invention and what the prior art teaches. In particular, the Office appears to confuse on several occasions, as discussed in more detail below, what may occur within the extruder with what occurs outside of the extruder, both with respect to the cited prior art and with respect to the claimed invention. When one considers the prior art and the claimed invention in the appropriate context, it is clear

that the skilled artisan would not have arrived at the claimed invention even if Belli is combined with Harlin.

Moreover, Applicants respectfully submit that the Office has failed to consider Belli and Harlin as a whole, including those portions that teach away from the claimed invention, as required by *Graham v. John Deere Co.*, 383 U.S. 1, 17, 148 U.S.P.Q. 459, 467 (1966), and its progeny, including *KSR Int'l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1730, 82 U.S.P.Q.2d 1385, 1388 (2007). *See also* M.P.E.P. § 2141.02(VI) ("A prior art reference must be considered in its entirety, as a whole, including portions that would lead away from the claimed invention.") (second emphasis added). Instead, the Office has improperly picked and chosen only certain portions of Belli and Harlin while improperly ignoring other disclosures of these references that teach away from the claimed invention.

1. **"said expanding . . . step[] c) . . . being carried out downstream of said extruder by heating said coating layer made of expandable and cross-linkable polymeric material at atmospheric pressure by means of a heating fluid."**

First, the Office has not addressed Applicants argument that Belli does not teach "expanding . . . step[] c) . . . being carried out downstream of said extruder by heating said coating layer made of expandable and cross-linkable polymeric material" The Office simply repeats that Belli teaches expanding while extruding. *See* Nov. 20, 2008, Final Office Action at 6. Namely, the Office asserts that "Belli does in fact teach **expanding** being carried out **by heating**, as the extruding process is performed at an elevated temperature and that temperature depends on the desired degree of expansion of the polymer (see Belli, pg. 13, lines 3-7)." *Id.* (emphasis added).

No only is it irrelevant that Belli's extrusion process is at an elevated temperature since the claim expressly requires that the heating step c) occurs AFTER the extruding step a) and the forming step b); the Office's argument regarding Belli's teachings is technically incorrect.

Belli does not teach that the expansion of the polymer is carried out by **heating**. Belli simply states that "[t]he expansion of the polymer is normally carried out **during the extrusion phase**" (see Belli, page 12, lines 6-7), and that "the die in the extruder head will have a diameter slightly smaller than the final diameter of the cable with expanded coating which it is intended to obtain, so that the **expansion of the polymer outside the extruder allows to reach the desired diameter for the cable.**" See *id.* at page 12, line 32 - page 13, line 2 (emphasis added).

Thus, according to Belli, the expansion is carried out downstream of the extruder while the extruded polymer material has a temperature which is determined by the preceding extrusion step and which temperature is not positively increased, as it would be if a "heating step" took place as alleged by the Office. To the contrary, the expansion step taught by Belli is carried out while the extruded polymer material undergoes an inevitable cooling due to the loss of heat by convection and radiation from the polymer towards the outside environment in which no heat sources whatsoever are provided.

In this regard, the Office appears to have a technical misunderstanding: any heating step of the extruded coating layer, in fact, presupposes that a heat source having a temperature above the temperature of the extruded polymer material must be in a heat exchange relationship with the latter. Nothing of this kind occurs in Belli,

which, therefore, cannot teach any **expanding** step carried out **by heating**, as alleged by the Office.

Second, Applicants maintain their prior response that the Office has failed to cite any evidence or to offer any argument as to how one skilled in the art would have known how to make a cable, wherein the process comprises expanding and crosslinking the expandable and cross-linkable polymeric material at atmospheric pressure by means of a heating fluid AFTER the extruding step a) and the forming step b). The mere fact that they would be motivated to work at atmospheric pressure does not mean that one would have known how to achieve that feat, which is disclosed by Applicants.

The Office concedes in response that “Belli is silent to the pressure that the extrusion step is performed at,” but inexplicably argues that “the fact that an extrusion process for a similar method was known and taught in the prior art by Harlin would have been evidence that one of ordinary skill would have known how to operate an **extruder** for this method at **atmospheric pressure**, if desired.” Nov. 20, 2008, Final Office Action at 6 (emphasis added). Further, the Office alleges that “there is no evidence presented by Applicant, Belli, or Harlin that shows that the proposed combination of teachings of Belli and Harlin could not be combined with a reasonable expectation of success.” *Id.*

The Office’s argument appears to reveals yet another fundamental misunderstanding of what Belli discloses and even of what is technically possible. As an initial point, it is well known in the art that an extruder cannot extrude a material “at atmospheric pressure.” See, e.g., http://en.wikipedia.org/wiki/Plastics_extrusion

(attached herewith). Rather, an extruder must be operated under pressure, which, at the front of the extruder, may exceed 5,000 psi (34 MPa), in order to extrude the polymer material through the extrusion die. Such an operation would be impossible if the polymer material is not suitably pressurized. Thus, whether or not Harlin teaches a different process at atmospheric pressure is irrelevant. Indeed, neither Belli nor Harlin disclose that an extruder may be operated at atmospheric pressure. Nor would a person of ordinary skill in the art believe that such a process was feasible.

Moreover, Applicants disagree with the Office that Belli and Harlin present “similar” extrusion processes, or that one of skill in the art would have reasonably expected that a combination of Belli and Harlin would have been successful. Rather, Belli and Harlin concern different processes. Specifically, Belli discloses a method for expanding and crosslinking a polymeric layer. Expansion of the polymer may be carried out, for example, “by high-pressure injection of gas directly into the extruder cylinder,” usually at “an extrusion temperature [of] not lower than 140°C” Belli, page 12, lines 6-12 and page 13, lines 5-7. Crosslinking of the entire expanded polymer material may be carried out, for example, “by heating in the presence of a radical initiator,” or via silanes *id.* at page 13, lines 8-26.

In stark contrast, Harlin is directed to a process for crosslinking a polymer material with silane by means of infrared radiation. *See* Harlin, Abstract and page 1, lines 2-3. In order to avoid the use of high pressure systems for crosslinking, such as those using heating fluids (e.g., steam or thermal radiation) (*see id.* at page 1, lines 21-25 and page 2, lines 7-12), Harlin discloses extruding polymer material and, after extrusion, crosslinking that material “by heating only the peroxide . . . instead of the

entire polymer material" using infrared radiation. *Id.* at page 2, lines 13-17 and page 4, lines 15-17 and 28-35. Harlin emphasizes that its disclosed infrared radiation crosslinking method avoids the alleged disadvantages of heating the entire polymer. *See, e.g., id.* at page 2, line 33 – page 3, line 2, and page 4, lines 1-14; *see also id.* at page 4, line 36 – page 5, line 2 ("The process is characterized by the heating being performed by means of infrared radiation in a wavelength range that is absorbed substantially only by the initiator used.").

Accordingly, one of skill in the art considering the scope and content of Belli and Harlin as a whole, including those portions that teach away, as required by *Graham* and *KSR*, would have understood that high pressure systems for crosslinking could be avoided by heating only the initiator present in the polymer material by infrared radiation, rather than by heating the entire polymer material using a heating fluid, such as steam or thermal radiation. Harlin, therefore, would have taught one of skill in the art away from heating the entire polymer material using a heating fluid if normal atmospheric pressures were desired.

Third, Belli does not teach "expanding . . . being carried out by heating said coating layer . . . by means of a heating fluid." While Belli does teach expanding the composition **in the extruder** via heat; nothing in Belli suggest the use of heating fluid, particularly **after** extrusion. While Applicants agree that "[o]ne of ordinary skill would acknowledge that air within the extruder would rise in temperature" (Nov. 20, 2008, Final Office Action at 7), such air would not constitute a heating fluid and certainly not a heating fluid applied **after** extrusion for at least the following reasons:

* A fluid may be a “heating” fluid only if it has a temperature which is higher than the temperature of the polymer material. This does not occur in Belli.

* Belli teaches that expansion of the polymer occurs outside of the extruder, so the “air or other gaseous elements within the extruder at an elevated temperature surrounding the polymer” cannot be related to the claimed step of expanding and cross-linking the coating layer by heating the latter at atmospheric pressure by means of a heating fluid downstream of the extruder.

* Belli does not disclose that the air or other gaseous elements “surrounding the polymer” within the extruder have a temperature higher than the polymer in order to further heat the same. At page 12, lines 26-33, Belli simply mentions a list of expansion gases which may be injected at high pressure into the extruder cylinder in order to carry out the expansion (see in this regard also the disclosure at page 12, lines 6-12 of Belli). Notably, Belli provides no guidance as to the temperature of these gases. Even assuming for the sake of argument that convective heating takes place, as the Office suggests (see Nov. 20, 2008, Final Office Action at 6-7) and which Applicants do not concede, the heat transfer would occur the other way round, that is, from the polymer - which is heated by the mechanical action of the extruding screw(s) - to the expansion gases which are only said to be injected at high pressure.

* Contrary to the Offices' allegation, there is no “air or other gaseous materials surrounding the polymer” within the extruder. According to Belli, and as is well known to those skilled in the art, the expansion gases are injected at high pressure into the polymer mass to generate the expansion of this mass outside of the extruder once the polymer has left the extrusion die.

Thus, contrary to the Office's understanding of the technology, one of ordinary skill in the art would understand from Belli that the temperature of any air injected within the extruder would rise to, at best, the temperature of the polymer material, while cooling the polymer. Thus, the air would be considered a cooling fluid.

Consequently, Belli does not teach any expanding step carried out **by heating by means of a heating fluid**, as alleged by the Office, since heating in this way presupposes the existence somewhere in the process disclosed by Belli of a fluid having a temperature higher than the temperature of the polymer material, which is actually not the case.

Regardless, as discussed above, the amendment to claim 14 to clarify that the steps of expanding and cross-linking the coating layer are carried out by heating downstream of the extrusion apparatus render moot the Office's rejection, which appears to be based on a misunderstanding of the prior art and the claimed invention, as discussed above.

For at least these reasons, Applicants respectfully submit that the rejection is improper and should be withdrawn.

2. **“said . . . cross-linking step[] . . . d) being carried out downstream of said extruder by heating said coating layer made of expandable and cross-linkable polymeric material at atmospheric pressure by means of a heating fluid.”**

First, contrary to the Office's allegation (*id.*), the air around Belli's polymer would not constitute a heating fluid for purposes of cross-linking step d), for the same reasons provided above with respect to expanding step c). Namely, the gas that is injected into the extruder would be heated to the same temperature as the polymer matrix and thus, cannot be a **heating** fluid that can instigate crosslinking after extrusion.

Second, whether or not "Harlin is used as a reference to teach operating the extrusion process at normal atmospheric pressure, and there would have been motivation to combine this with the teachings of Belli" (*id.*), Applicants' argument remains that Harlin's teaching of selective use of infrared radiation is not a teaching of a heating fluid and does not correct this deficiency of Belli.

The Office's arguments again highlight the fact that the Office appears to have a fundamental misunderstanding of Harlin. Specifically, Harlin cannot teach that an extruder may be operated at atmospheric pressure since, as discussed above, a high pressure is required within the extruder in order to extrude the polymer material through the extrusion die. Rather, Harlin teaches something different, namely that with the silane crosslinking process it is possible to use "simple extrusion lines at normal atmospheric pressure", that is, "lines" that are not under pressure downstream of the extruder as it occurs in the prior art discussed and criticized by Harlin in the preceding paragraphs (*see* Harlin, page 1, line 21 – page 2, line 12). Thus, the apparent technical basis for combining Belli with Harlin - that of operating the extrusion process taught by Belli **at normal atmospheric pressure** as allegedly taught by Harlin - is meritless.

Moreover, the Office has improperly picked and chosen only those portions of Harlin that allegedly support his position of obviousness while disregarding the rest of Harlin which clearly teaches away from the claimed invention. The Office cannot have it both ways.

Even assuming for the sake of argument that one of skill in the art would have been guided to modify the method of Belli with the method of Harlin, which Applicants do not concede, that person would have only been guided to crosslink the polymer

material of Belli by heating only an initiator present in the polymer material, rather than the entire polymer material, using infrared radiation, rather than a heating fluid, under normal atmospheric conditions. The skilled artisan would not have been guided to expand the polymer material under normal atmospheric conditions using a heating fluid. Indeed, as the Office admits, Belli fails to teach the expansion and crosslinking steps at atmospheric pressure, and Harlin only “teaches the method of cross-linking a layer by curing/heating after extrusion under normal atmospheric pressure.” *Id.* at 4 (emphasis added). In contrast, the claimed invention recites that the coating layer is expanded and crosslinked downstream of the extruder by heating the coating layer at atmospheric pressure by means of a heating fluid. Thus, even if one of skill in the art was guided to modify the method of Belli with the method of Harlin, that method would not have resulted in the claimed invention.

Lastly, Applicants maintain that neither Belli nor Harlin teach or suggest “cross-linking . . . being carried out by heating said coating layer . . . by means of a heating fluid.” As noted above, Belli’s alleged heating fluid, which is not even a heating fluid, is applied during extrusion and not to the coating layer afterwards. And, Harlin’s crosslinking by “heating only the peroxide” in a polymer mass by means of infrared radiation (see Harlin, Abstract, page 4, line 15 to page 5, line 2 (emphasis added)) teaches away from heating the entire polymer. Indeed, the Office admits that Harlin teaches away from heating “the entire polymer material” in the cross-linking process **after the extrusion** (see Nov, 20, 2009, Final Office Action at 7-8), which is exactly what happens when the claimed process is carried out, which uses a heating fluid to heat the coating layer **after the extrusion**. Thus, even if one of skill in the art would

have been motivated to combine Belli with Harlin, which Applicants do not concede, that skilled person would still have never arrived at the claimed invention.

Applicants acknowledge the Office's argument that "only the extrusion process of Harlin was referenced in the office action, not any extrusion steps." Nov. 20, 2008, Final Office Action at 8. However, as discussed previously, the Office cannot and pick and choose the teachings from a reference unless the references provide such guidance. Here, the Office has no basis for why a person skilled in the art would take one teaching from Harlin and not the other.

For these additional reasons, Applicants respectfully submit that the rejection is improper and should be withdrawn.

B. The Office maintains the rejection of claim 20 under 35 U.S.C. § 103(a) as being unpatentable over Belli in view of Harlin, as applied to the claims above, further in view of U.S. Patent Application Publication No. 2001/0002075 A1 to Chaudhary et al. ("Chaudhary") for the reasons of record. See Nov. 20, 2008, Final Office Action at 4-5.

Applicants respectfully traverse this rejection for the reasons of record and for the additional reason below.

As discussed above, Belli and Harlin, whether alone or in combination, fail to teach or suggest the claimed invention. Since claim 20 depends from claim 19, which depends from as-amended claim 14, the Office's rejection of claim 20 suffers the same set of deficiencies, which Chaudhary fails to cure. Accordingly, Applicants respectfully submit that this rejection is improper and should be withdrawn.

III. Conclusion

In view of the foregoing amendments and remarks, Applicants respectfully request the entry of this Response, the Office's reconsideration of the application, and the timely allowance of the pending claims.

If the Office believes a telephone conference could be useful in resolving any outstanding issues, he is respectfully invited to contact Applicants' undersigned counsel at (202) 408-4152.

Please grant any extensions of time required to enter this response and charge any additional required fees to our Deposit Account No. 06-0916.

Respectfully submitted,

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Attachment: http://en.wikipedia.org/wiki/Plastics_extrusion (last visited February 20, 2009)